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SUPPLY

February 4, 1985

U. S. Nuclear Regulatory Commission
Division of Licensing
Washington, D.C. 20555

ATTENTION: Mr. James R. Miller, Chief
Operating Reactors Branch #3

SUBJECT: Calvert Cliffs Nuclear Power Plant
Units Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Inservice Inspection Program Request For Relief from ASME Code Section XI Requirements Determined to be Impractical

Gentlemen:

In accordance with 10 CFR 50.55 a(g)(6)(i), we are requesting an exemption from ASME Code Section XI requirements that have been determined to be impractical. In accordance with NRC Staff Guidance letter dated November 24, 1976, the information concerning the exemption request is presented herein.

It has been determined that certain examination requirements for reactor coolant pump casings are impractical to perform. ASME Code Section XI requires volumetric examination of casing welds and visual examination of internal pressure boundary surfaces of one pump casing be performed during each inspection interval. The impracticality of performing these exams is not unique to Calvert Cliffs. This has initiated generic studies to evaluate the need for inspection and to develop specific inspection techniques. To date, no technique has been proven practical for performing volumetric Inservice Inspection of the Type E pump design installed at Calvert Cliffs. Visual examination of the internal pressure boundary surfaces would be limited due to the internal configuration and radiation fields. Pump disassembly for the sole purpose of conducting a very limited visual examination is impractical in light of the manhours and radiation exposure that would be expended.

A tabulation of the information required for this request is presented below.

I. **COMPONENT FOR WHICH RELIEF IS REQUESTED:**

A. Name and Number

Calvert Cliffs Unit 1 reactor coolant pumps #11A, #11B, #12A, and #12B and Calvert Cliffs Unit 2 reactor coolant pumps #21A, #21B, #22A, and #22B. All pumps are identical in design and function and are Byron-Jackson Type DFSS Reactor Coolant Pumps, Serial Numbers 681-N-0437 through 44, Size 35 X 35 X 43.

Rec'd w/ check $150.00

A047
1/0

B. Function

Each Calvert Cliffs unit has four reactor coolant pumps which are welded to the 30" recirculation loop. These pumps function during normal reactor operation to provide forced recirculation through the core.

C. Code Class

Current ISI Class: Class 1

Original Design: ASME Code Section III, 1965 Edition with Addenda through Winter 1967, Class 1

II. CODE REQUIREMENT FROM WHICH RELIEF IS REQUESTED:

ASME Code Section XI 1974 Edition with Addenda through Summer 1975 examination categories B-L-1 and B-L-2 require volumetric examination of casing welds and visual examination of internal pressure boundary surfaces of one pump casing in each of the pump groups performing similar system functions each inspection interval. These examinations are impractical for the reactor coolant pumps at Calvert Cliffs Units 1 and 2 and relief is, therefore, requested as provided by 10 CFR 50.55a(g)(6)(i).

III. SUPPORTING INFORMATION

A. The design configuration of the pump corresponds to a Type E pump illustrated in Figure NB-3442.5-1 (1977 Edition, ASME Code Section III). No practical technique currently exists to perform Inservice Inspection Radiographic Examination (RT) or Ultrasonic Examination (UT) of this pump type.

B. The presence of the diffuser vanes precludes conventional RT. The vanes prevent placement of the RT film cassettes inside the pump (as does the radiation field in terms of radiographic film and personnel radiation exposure). Placement of the film on the outside of the pump is feasible, but there is no radiographic source suitable for placement inside the pump. Standard isotopic radiation sources are too weak to penetrate the thick casting and background radiation from the inside surface of the pump would diminish sensitivity. Special strong isotopic sources would be impractical to handle and position inside the pump due to personnel radiological exposure from the radiographic source itself. The recently developed Miniature Linear Accelerator (MINAC) was considered, but the Type E pump design precludes positioning of the accelerator inside the pump. Double wall radiography utilizing the MINAC has also been considered with some hope of attaining meaningful radiographs of a portion of the casing welds. This technique has not been qualified to date and appears to be some time off, if, at all possible.

C. The coarse grain structure inherent in thick stainless steel castings precludes the use of conventional UT. Future developments in ultrasonic techniques may provide a method to examine thick stainless steel casting and if developed this would be preferred over the difficulties and dangers of thick wall radiography. We are hopeful that the Ultrasonic Data Recording and Processing System (UDRPS) technology may provide some breakthrough to stainless steel casting UT.

D. The pump casing is fabricated from cast stainless steel (ASTM A351, Grade CF8M). The material is essentially a cast-type 316 stainless steel. This material is widely used in the nuclear industry and no industry failures of this type material in reactor coolant pumps have been noted. The presence of delta ferrite (typically 15% or more) imparts increased resistance to intergranular stress corrosion cracking (IGSCC). The delta ferrite also improves resistance to pitting corrosion.

E. Report Number ERP-06-102, Revision 0, August 1983, prepared for the Electric Power Research Institute by NUTECH Engineers, Incorporated, concludes that:

1. Based on the generic pump casing analysis, there is justification for the extension of the pump-casing examination up to 15 years.

2. Plant-unique analysis will show greater margins of safety.

3. The tearing modulus analysis shows that large, final flaw sizes can be tolerated in the pump casing before fracture is predicted.

4. The recent 10-year Inservice Inspection of several pump casings (Type F) indicates no detectable flaw growth from base line inspections, which corroborates the above analytical conclusion.

F. Pump disassembly for the sole purpose of conducting a very limited visual examination of the interior pressure boundary surfaces of a reactor coolant pump which, for the most part, has an as-cast surface texture is fruitless, particularly in light of the manhours and radiation exposure that would be expended.

G. Over 1,000 manhours and over 50 person/rem is estimated to disassemble, visually inspect, and reassemble one reactor coolant pump. The manhour estimate is based only on on-site outage work performed by Maintenance Operations, and Nondestructive Testing personnel. The estimate does not include engineering time or pre-outage job planning. Additionally, manhours and person/rem will be expended by Radiation Protection personnel providing direct coverage. The time required to perform the disassembly and inspection would be approximately two weeks of critical path time. Most of the work would be performed under full face mask conditions.

IV. **IN LIEU OF TESTING**

A. The pump interior will be inspected to the extent practical (in recognition of the vanes therein) should the pump be disassembled for any other reason.

B. The reactor coolant pumps shall be hydrostatically tested per the requirements of ASME Code Secion XI.

The need for this exemption was recognized during our initial Inservice Inspection program development. At that time our NRC Resident Inspector requested that we forego exemption request submittal in hope that techniques might be developed and qualified by the end of our first 10-year interval. It is now apparent that no such technique applicable to our pumps will be available before our first interval concludes.

We have determined that this request constitutes an amendment for Calvert Cliffs Unit Nos. 1 and 2, pursuant to 10 CFR 170.21. Accordingly, Baltimore Gas & Electric Check No. B396518 in the amount of $150.00 is remitted herewith.

Should you have further questions regarding this matter, please do not hesitate to contact us.

Very truly yours,

Arthur E. Lundvall

AEL/BCR/gla

Attachment

cc: D. A. Brune, Esquire
D. H. Jaffe, NRC
G. F. Trowbridge, Esquire
T. Foley, NRC